

REMARKS

Claims 1-10 and 12-17 are pending in the application. Claims 4, 5, and 12-17 are under examination. Claims 1-3 and 6-10 are withdrawn in response to the prior restriction requirement. In the Office Action mailed May 8, 2009, claims 12 and 15 are objected to because of informalities. Claims 4, 12, and 14-17 are rejected under 35 U.S.C. 112, first paragraph as failing to comply with the written description requirement. Claims 5, 13, and 14 are rejected under 35 U.S.C. 112, second paragraph as being vague and indefinite.

I. Amendment and Response to Claim Objections

Claims 12 and 15 are objected to because of an informality, the grammatically awkward recitation of "... solid support, the increase in electrophoretic force being caused ...". The Applicants have herein amended claims 12 and 15 to rephrase the limitation as "... solid support, wherein the increase in electrophoretic force is caused ...". No new matter is added by these amendments. Entry of these amendments and withdrawal of the objections to claims 12 and 15 is therefore respectfully requested.

II. Amendment and Response to Rejections under 35 U.S.C. 112, first paragraph

Claims 4, 12, and 14-17 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement, for allegedly containing subject matter which is not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors, at the time the application was filed, had possession of the claimed invention. As a preliminary matter, the Applicants note that, while claims 12 and 14-17 are listed as being rejected under this section, no explanation of the reason for rejection of these claims is given. It is presumed in this response that claims 12 and 14-17 are therefore rejected solely for being dependent upon a rejected base claim. Clarification of this matter is respectfully requested.

In particular, independent claim 4 is rejected because the passages of the specification suggested by the Applicants allegedly fail to support the claim limitation "the channel opening supporting at least one detector." The Applicants respectfully traverse the rejection. The Office Action acknowledges that "paragraphs [0029] and [0135] of US 2005/0227235A1 (the published application) describe that "DNA is synthesized on a non-fluorescent solid support and passes through a sub-micron size opening, known as a nanopore, with a fluorescence detector" and "DNA is synthesized on a non-fluorescent solid support and passes through a channel opening, known in

the art as a nanopore, with a detector”, but nonetheless asserts that “nowhere in the specification supports the limitation “the channel opening supporting at least one detector” as recited in claim 4 [May 8, 2009 Office Action at page 3, item 6]. The Applicants respectfully disagree with this conclusion, both under the conventional rules of English grammar and also because it is impossible to see how else the cited passages could be interpreted. Furthermore, the Applicants respectfully point out that Fig. 14A, also cited by the Applicants in support of the amendment, clearly shows a channel opening supporting at least one detector.

The statements cited by the Applicants, and acknowledged in the Office Action, when read according to the conventional rules of English grammar, clearly recite a channel opening and submicron opening that have, located thereon, a detector. According to these rules, when clarifying phrases, such as the extent “, known as a nanopore,” and “, known in the art as a nanopore,” are contained within a sentence, they may be dropped out without altering the meaning of the sentence, and in fact it *must* be possible to drop them out without altering the meaning of the sentence or the sentence is grammatically incorrect. Under this rule, then, the cited sentences may be read as “DNA is synthesized on a non-fluorescent solid support and passes through a sub-micron size opening ... with a fluorescence detector” and “DNA is synthesized on a non-fluorescent solid support and passes through a channel opening ... with a detector”. The Applicants respectfully suggest that the only viable interpretation of these sentences is that the referred-to submicron and/or channel opening has a detector. The only other interpretation of these sentences that is even possible is that the detector also passes through the opening, along with the DNA and the support, which interpretation clearly makes no sense to anyone of skill in the art of the invention or in the larger art of detector technology generally, which interpretation would serve to render the detector inoperable and/or unsuited for its intended purpose, and which interpretation is clearly inconsistent with the remainder of the Applicants’ Specification and Drawings. In particular, such an interpretation is inconsistent with Fig. 14A, previously cited by the Applicants, in which the “light source” (left box) and “fluorescence detector for feedback” (right box) are clearly labeled and shown located at the top of the (also labeled) “nanopore that bead passes through”. The Applicants respectfully submit, therefore, that the Applicants’ claimed “channel opening supporting at least one detector” is amply supported by the Applicants’ Specification and Drawings, that it is clear that the inventors, at the time the application was filed, had possession of the claimed invention, that the underlying technology of the limitation is well-known in the art of the invention, and that the rejected claims therefore satisfy the requirements of 35 U.S.C. 112, first paragraph.

Reconsideration and withdrawal of the rejection of claim 4 under 35 U.S.C. 112, first paragraph, is therefore respectfully requested.

The Applicants do note that the phrasing of the limitation in question (“the channel opening supporting at least one detector”) is not exactly the same as the language used within the Specification (“a channel opening ... with a detector”), even though it clearly has the same meaning. In view of the remote possibility of ambiguous interpretation, noted above as being illogical, the Applicants’ limitation as recited was intended to remove any possibility of ambiguous interpretation. The Applicants could equally have recited “a channel opening with a detector” (which is identical to the language found in the Specification) or “a channel opening having a detector” (which is identical in meaning to the language used in the Specification), both of which have exactly the same meaning as the language selected by the Applicants. However, in order to resolve this matter, the Applicants have herein amended claim 4 to use the exact language of the Specification, reciting a channel opening with at least one detector, even though the Applicants continue to believe that this amendment makes the Applicants’ claim limitation less clear. Support for this amendment is found in the published application (US2005/0227235A1) at least at paragraphs [0029] and [0135], and in Fig.14A. No new matter is added by this amendment, entry of which is respectfully requested. The Applicants respectfully submit that this limitation of claim 4, as amended, is fully supported by the written description, that it is clear that the inventors, at the time the application was filed, had possession of the claimed invention, that the underlying technology of the limitation is well-known in the art of the invention, and that the rejected claim therefore satisfies the requirements of 35 U.S.C. 112, first paragraph. Reconsideration and withdrawal of the rejection of claim 4, as amended, under 35 U.S.C. 112, first paragraph, is therefore respectfully requested. Furthermore, since claims 12 and 14-17 depend from currently amended independent claim 4, which is in condition for allowance, dependent claims 12 and 14-17 are therefore also in condition for allowance. Reconsideration and withdrawal of the rejection of claims 12 and 14-17 under 35 U.S.C. 112, first paragraph, is therefore respectfully requested.

III. Amendment and Response to Rejections under 35 U.S.C. 112, second paragraph

Claims 5, 13, and 14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite. As a preliminary matter, the Applicants note that, while claim 13 is listed as being rejected under this section, no explanation of the reason for rejection of this claim is given. It is

presumed in this response that claim 13 is therefore rejected solely for being dependent upon a rejected base claim. Clarification of this matter is respectfully requested.

Claims 5 and 14 are rejected as being vague and indefinite because “[s]ince the claim does not indicate that the sequence of the synthesized nucleic acid has deletion errors in the sequence and how the deletion errors in the sequence of the synthesized nucleic acid is correlated with the deprotection of the 5’ protecting group, it is unclear why any kind of deletion errors in the sequence of the synthesized nucleic acid can be eliminated by detecting at least one 5’ protecting group in the flowed wash as recited in step b)”, and also because “according to the phrase ‘flowing the deprotection wash and any removed 5’ protecting group through a channel opening’ in step b), a removed 5’ protecting group is in the flowed wash, while according to the phrase ‘monitoring the flowed wash for the presence or absence of a removed 5’ protecting group’, the first part and the second part of step b) do not correspond to each other”. Claim 14 is additionally rejected for the reason that “it is unclear that the eliminating step is performed after step e) of claim 4 or is performed after any of steps a) to e) of claim 4.”

The Applicants thank the Examiner for pointing out these inconsistencies and respectfully traverse the rejections of claims 5 and 14 in light of the amendments submitted herewith. In order to clarify that deletion errors in the sequence of a nucleic acid being synthesized can be prevented during synthesis by removing the 5’ protecting group from each added nucleotide or oligonucleotide in order to prevent a 5’ protecting group attached to a nucleotide or nucleotide added in a previous synthesis step from causing a “false positive” for the addition of a nucleotide or oligonucleotide during the next synthesis step (and hence causing a deletion because the next nucleotide was not, in fact, added, despite the positive detection) and then confirming the removal of the 5’ protecting group by detecting it in the wash, the Applicants have herein amended claims 5 and 14 to specifically recite that the nucleic acid is synthesized by addition of a nucleotide or oligonucleotide having a 5’ protecting group and that deletion errors in the sequence of the synthesized nucleic acid are prevented by the steps of deprotecting the synthesized nucleic acid by using a deprotection wash to remove the 5’ protecting group, flowing the deprotection wash and the removed 5’ protecting group through a channel opening, monitoring the flowed wash for the presence of the removed 5’ protecting group by recycling the flowed wash until the presence of the removed 5’ protecting group is detected in the wash, and repeating the steps of synthesizing and preventing until the sequence of the synthesized nucleic acid comprises the user-specified sequence composition and length. In addition, the Applicants have herein also amended claim 14 to add a

step number for the newly added step and to clarify that the newly added step may be performed at any time after the claimed step of synthesizing, as well as be repeated as often as required for completion of the synthesis of the nucleic acid. Support for these amendments is found in the published application (US2005/0227235A1) at least at paragraphs [0019], [0029]-[0030], [0071], [0098]-[0100], [0112], [0116], and [0136], and in Figs. 14A and 14B. No new matter is added by these amendments. Entry of these amendments and reconsideration and withdrawal of the rejections of claims 5 and 14, as amended, under 35 U.S.C. 112, second paragraph, is therefore respectfully requested. Furthermore, since claim 13 depends from currently amended independent claim 5, which is in condition for allowance, dependent claim 13 is therefore also in condition for allowance. Reconsideration and withdrawal of the rejection of claim 13 under 35 U.S.C. 112, first paragraph, is therefore respectfully requested.

IV. Conclusion

A Request for Continued Examination is being submitted with this response, which is being submitted in lieu of filing an Appeal Brief. The Applicants' Appeal is therefore deemed to be withdrawn. Claims 4, 5, 12, 14, and 15 have been amended. No new matter is presented by these amendments. The Applicants respectfully submit that claims 4, 5, and 12-17 are now in condition for allowance, which action is now requested. For this reason, and in view of the foregoing arguments, the Applicants believe that this application is now in condition for allowance, which action is respectfully solicited. Should there remain any unresolved issues, it is respectfully requested that the Examiner telephone Norma E. Henderson, Applicants' Attorney, at 603-437-4400, so that such issues may be resolved as expeditiously as possible.

Respectfully Submitted,



Norma E. Henderson
Attorney/Agent for Applicants
Reg. No. 39,219

May 10, 2010

Date

Henderson Patent Law
13 Jefferson Drive
Londonderry, NH 03053-3647
Tel/Fax: 603-437-4400
normahenderson@comcast.net